Notebook Series -- Notebooks by Edison and Other Experimenters
Recorder and Recording Experiments -- A. M. Kennedy Books
Notebook, N-15-08-02.2

This notebook is a continuation of N-15-06-04.2. It was used by Absalom M. Kennedy during August-September 1915 as a daily record of experiments and tests with phonograph recorders. The daily record is continued in N-15-09-17. The tests involve various recording machine parts and instruments and variations in the positions of voices, instruments, and recording horns. Kennedy's notes also describe other projects, such as his work for Miller Reese Hutchison on a wireless telephone system and his presentation at a phonograph jobbers convention, and they document Edison's own involvement in the phonograph experiments, including his comments, suggestions, and further instructions. One entry describes Edison's specifications for the "ideal" recorder and includes a drawing by him, which has been taped into the book. Additional comments and instructions by Edison have been taped onto the first page of the book. Other individuals involved in the work include Zachariah P. Halpin, C. D. Ries, and experimenters named Parkhurst and Taylor (probably Henry A. Taylor). Some of the tests and demonstrations were done on orders from Hutchison, Jonas W. Aylsworth, or Charles Edison. The front cover is labeled "Recording Experiment Book #4. From Aug. 2 To Sept. 16." The pages are unnumbered. Approximately 140 pages have been used.

What I am after is to see how ~~much can~~ far a singer can go from the funnel & yet give the same volume with a smaller light funnel which should not change quality

This should permit ~~us~~ us to get loud choruses work

I make the flare comparatively larger to get both sides of the waves by return reflection

Aug. 2, 1915. contd.

Miss Imgrund came in afternoon. Tested out recorders as follows (Miss D'o ermacon follows in each case.
1st Piano - Chanson Triste -

#70 Used as standard (#70 Standard)
#44 Fuller - weaker but more natural - bell like. [fuller, more mellow, no so brilliant]
#53 Sharper than #44 - little more plunky but fuller than 70 [same as 44 but not so clear, q x a poor]
#55 Louder than 44 or 53 - better & cleaner & stands out better [louder, not so mellow]
#58 Tuffer sharper than #55 - Clean - stands out well - fine - natural. [not as mellow as 44 - delivery more tone especially in lower. upper hard and thin. more mellow than 55]
#60 Little further back than 55 or 58. Needs work - not as loud - [Tone - a little twang to upper]

#6 ✓ - Stands out - Holds well - perhaps not as loud as 55. [not as sweet or even 52 twang - a little - not as loud as 55]

#57 - Voice pounds nasal in comparison. Piano good but sharper than above. [Sweet not very clear]

52 - Voice little more muffled. Piano very good. [Sweet. mellow. Not much tone - thin even]

#54 - Voice & piano sharper than above. Loud. [Not as sweet twangy]

57 - Not as loud as 54. Little fuller but shows percussion. [Fine - twangy]

58 - Clear - not as loud as 54 - clear & distinct - little plenty [Fine. a little hoarse - twangy]

Decided that for piano the recorders were best in order named and these were again tested.

#52 - 55 - 62 - 58 -

#52 - Little weak & black in horn. Quality plunky -

#62 Voice louder & clearer & quite better. Piano little less fine & ring but clear & distinct.

#58 Voice - piano not quite as loud as 62. Piano about same quality. Clear & clean

#55 Louder & clearer but better than 62 or 58, not quite as full as much ring as 52 but clear & distinct!

Next tried scales - ~~clearer~~ & passenuso on 55 & 62 ✓. In conclusion.

Voice test.
Showed 62 & 55 clearer than 52 & cleaner

Aug. 3, 1915.

Wrote up report.

Made records & tests of Mrs. _____ from Kansas.

Ran talking picture for Aylesworth.

Finished up phonograph with Music Master Horn for Chase.

Began on Record #50 with Gold Beater's skin diaphragm. This is too weak & flabby. Tore down after finishing.

Had Mr. Edison listen at Piano Record R58 - said improvement but the percussive sound was pronounced.
Quartette from Rigoletto. Best balance and dressing but poor recording.
Song from Magic Lute - Hangreaves - Fine. Piano especially good.

Aug. 4, 1915.

Made up reader #50 with drum head & tested out. Very loud. Will need more testing to determine.

Mounted up .008" sapphires in arms ready to use.

Mr. Head and Mrs Mickle came out. Made new piano record of Mrs Mickle. Made record also of Head.

Heads record with reader #58 - Mrs Mickle with #50.

#50 very loud but inclined to paint. Probably because no discs other center drive.
#58 not so loud & not inclined to paint.

1st test.
Seems loud & rather full.
Rattles a little. need further test to determine.

Stands out fine.

Aug. L-15

#50 - 4 minute recorder.
Brass head. Knife edge pattern - 1/4" diameter.

Diaphragm - old drum head marked "Porpoise" - .0045" thick.

Regular aluminum arm and .008" sapphire.

Aug 5, 1915.

Made up Recorder #41

Took up M.P.X. wireless telephone with Mr. Kuhn.

Made up recorder #37.

Mrs. Johannes came for test. Had bad. Made trials with several records. They were not very good.

Miss Alice Carey came for trial. She does not record well, I do not know why as her voice sound clear & fresh ordinarily but so sharp and not very pleasant recorded.

Met Mr. Macneal on discussion plans for Jobbers convention next week.

#41 - Preliminary test - Sharp and weak - Too weak for use.

8/5/15

#41 - 4 minute reader - Brass Head. Knife edge pattern - 1¼" diameter.

Diaphragm. old drum head marked "Porpoise" - .0047 to .007" thick. Aluminum disc 7/8" x .008" waxed on outside.

Regular aluminum arm and .008" sapphire.

#37- Preliminary test. Sharp and very weak N.G.

8/5/15

37- 1 minute recorder
Brass Head - triangular rubber gasket pattern - 1 1/4" diameter.

Diaphragm - old drum head - marked "Porpoise" - .005-.007". Aluminum disc waxed on outside 7/8" x .008".

Regular aluminum arm with .008" sapphire.

8/6/15

Taylor finished up new recording heads with advance ball arms arranged for DISC as well as cylinder recording.

Made up #66 recorder from one of these with drum head diaphragm.

Talk with Mr. Edison on recorders. He outlined specifications for the ideal recorder he wanted:- One that will respond readily to soft sounds but will automatically fail to respond proportionally to loud sounds.
Said a substance like flexible stone which would give just so far and then stop would be necessary. That the physical motion of the diaphragm was so slight that mechanical means for deamplifying this

Make
Reader
M.V.

would probably be a failure.
Outlined one scheme.

Double diaphragm, strut fashion so that the elastic limit will hold up further motion.

Also sketched attached sheet on opposite page. This will have to be resketched and made practical.

Quartette came in afternoon. Singers in good condition but distractions made a rather unsatisfactory afternoon's work. Mrs. Reubens work especially good. Telephone, others in room talking & taking Hayes away make such work thing unsatisfactory.

Made four quartette records and two trios. Latter very loud.

C25-1

as Miss Rencen was singing her best.

Used recorder #66 as it seemed a little clearer & cleaner.

8/7/15

Looked after MDA Nurelec telephone. Designed new coil. Tried out coil. Mechanic made.

Set up .008" stylii in arms.

8/9/15 -

Made up recorder #64.

Got up material for talk at Convention.

Made talk & discussion at convention.

8/9/15

#64 - 4 minute recorder

Brass Head. Domed top
knife edge pattern - 1¼".

Diaphragm of Japanese
paper impregnated with
Condensite #1207
transfer varnish.

Cork cone 1" x ⅛" turned
to fit dome having aluminum
disc 1" x .005" waxed to it
and these fastened on inside
to diaphragm by
swelling with alcohol.

8/10/15

At Convention practically all day.

8/11/15

Expected dealer to make trial record. Did not come.

Tried recorders & piano recording with Miss Imgrund:

#58 - Little louder & sharper than 64
#64 - Not as loud as #58. Fuller. Very quiet.
#66 - Louder than either of above. Carries ring of piano longer.

Tried again with upright piano. This instrument is very much out of tune.

#58 - Much more natural than with Grand piano.
#64 - Softer, not so much ring. Holds or deadens down ring.
#59 - Sharper on both voice & piano.
#66 Louder than 58 or 64 & carries ring more.

Tried very soft touch on piano.

#55 - Very soft. Too low for commercial recording.

Brought piano closer to horn - within 16½".

#56 - Bigger, fuller, sweeter than before.

Tried then Tarantella with treble 9" & bass 11" from horn.

#57 - better than before on low high treble notes.

Voice trial - Miss Imgrund singing part of Aria from Samson & Dalila

#58 - Natural -

#59 - Very sharper & stands out better.

#60 - Natural, but sharper than #58

#66 - Louder & little sharper,

#44 - Excellent quality - loud & clear.

Miss Dingrud then tested various methods of using asia.

Afternoon - went to New York to get flexible tubing for Mr. E.

8/12/15.

Mr. M.G. Armagost came in morning for voice trial. Sang "Father, to Thee Me Look". – Has good loud voice, little throaty, but shows lack of practice and forcing.

Finished up recorder #65 and tested. Showed up too sensative & loud. Blasty.

Miss Dingfud came and brought violinist, Mr. Dansinger. First made trials of recorders

#58 – Very natural – Good both on violin and piano.

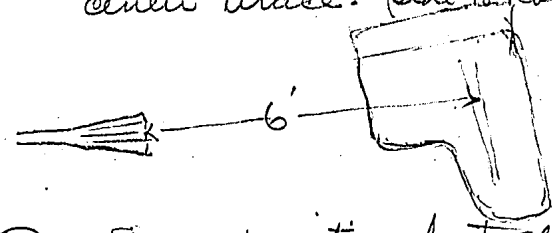
#44 – not as loud as 58. Shows tendency to squeak.

#66 – Little sharper & cleaner than 58 but not so natural.

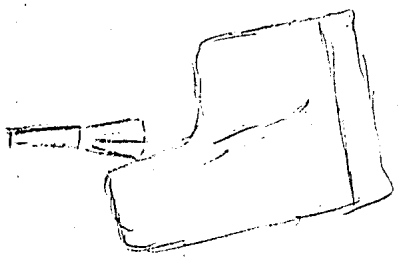
#59 – Sharp – weak – small on violin as compared with 58

Mr. Head and Mrs. Mickle came over in afternoon.

Practised out on piano recording
① Piano at 6', horn to large center brace. ~~side to horn~~



② Same position but closer
Horn 4' from brace
③ Piano in line with horn



Results showed ③ much better clearer & more distinct than ① or ②.

Then tried making records with upright piano and two horns. This showed up better from recording standpoint than with the grand piano but this old upright piano is out of tune and rattles badly.

Made up master for blue record.

8/10/15

① Too sensative and loud for piano. Very loud & tendency to blast on voice.

② Very sharp - weak - high pitched. Piano like & tin pannny.

8/12/15

#65. 4 minute reader.

Brass & lead. Domed top. Tapered Tube. Knifeedge pattern 1¼" diameter.

Diaphragm two thicknesses of Japanese paper coated with shellac, placed together and between two sheets of dry Japanese paper & pressed (only about 30 or 30#) between heated plates.

① Regular aluminum arm and .008" sapphire only

② Cork cone, turned to fit dome, 1" x 1/8", waxed to inside of diaphragm, regular aluminum arm and .008" sapphire.

8/13/15.

Changed #65 recorder to ② as per previous page and tested out. Did not show up well.

Worked with Taylor on Mr. E's stopped w buffer recorder.

Quartetto came in afternoon. Got down to work quickly & made record of Quartetto from Rigoletto on third trial. Tried others without improvement. Made trials of Trio from Faust.

8/14/15

Work writing up synopses of talks at convention talks.

8/16/18.

Finished writing synopsis of convention talks.

Wrote up report.

Worked with Taylor on Mr. Huffer.

First trial of this Taylor had rubber too long. Did not restrain enough.

Started Reader #65.

8/17/15

Finished recorder #65 & tested. Very loud and stands out fine! Full and natural tone.

Made up and tested out recorder #64. So thin & sharp and not loud enough as compared with #58 & #65.

Tested out new recorder #67 made with buffers. With no buffers touching was loud, very full with peculiar timbre like banjo. With bottom buffer touching became weaker & sharper still with banjo timbre. With 2 buffers, still weaker & sharper & with unnatural timbre.

Miss Dingmund came. Tested out recorders.
#65 showed up well on piano but sensative & sharp on voice
#64 too weak.
#63 too sharp & twangy.

8/17/15

(1) Very loud. Stands out fine. Full, natural. Little more sensative than #58.

(2) With Miss Imgrund phoned up well on piano — big, full, loud, natural sound out well. On voice was not as good as 58 — did not sound as natural —

8/17/15

#65 - 4 minute recorder

Brass head - Domed top - 1 1/4" diameter - Knife edge pattern.

Diaphragm of Japanese paper, impregnated with #1207 condensite transfer varnish, .0025" thick.

Cork cone, turned to fit dome, 1/8" x 1", fastened to inside of diaphragm by wetting with alcohol.

Regular aluminum arm with .008' sapphire.

8/17/15

(1) Thin, sharp, leak in horn, not loud enough.

(2) Rich Mrs. Imgrund, weak thin and sharp on piano

8/17/15.

#64 - 4 minute recorder.

Brass Head, Domed Top, Knife Edge Pattern, 1¼" diam.

Diaphragm of Japanese paper impregnated with thin solution of shellac. Two thickness of this was taken with cork cone turned to fit done between. These were heated and thus cemented together and to the cone, making the double thickness diaphragm .004".

Regular aluminum arm with .008" stylus.

(8) With Miss Ingrund on piano - loud & ~~stood out~~ well but sharper & more stringy than 65.

8/17/15

#63 - 1 minute recorder
Aluminum head. Domed Top
Knife edge pattern - 1¼" diam.

Diaphragm of Japanese paper impregnated with thin solution of shellac, two thicknesses of which with shellacked cork turned ~~& fit~~ dome were heated and ~~thus~~ fastened together with the cork between, making diaphragm about .005".

Regular aluminum arm with .008" sapphire.

8/18/15.

Went over to Kinetoscope Dept. to look up Kinetophone Film & Records. Found they had been put in Vault #9 and in good shape.

Nick Taylor fixing up outfit in Office Bldg.

Made Record # 54.

Miss Imgrund came in afternoon. Tried lot of piano experiments particularly with different horns. Found long horn #2 not so good as #7. #1 Long horn about as good as #7 on piano. Not on voice. Got improved results with angle horn 22" from bed of piano. Piano cover removed, recording machine raised up on box. These recording was best we have yet obtained with piano.

#54 - Very low could scarcely be heard.

Made over

8/18/15

#54 - 4 minute recorder.

Brass Head - Domed Top - Knife Edge Pattern, 1¼" diam.

Diaphragm of Japanese Paper impregnated with thin solution of Shellac. Two thicknesses of this with cork cone 1⅛" x ⅛" turned to fit dome, which so shellacked, between are heated and this fastened together making diaphragm about .0035" thick.

Regular aluminum arm and .008" sapphire.

8/18/15

Made test with record of Armogot
The master of which was repro-
-duced once for first half and
not reproduced on last half —
see if this made any difference
as a master.

8/19/N

Teaching Supervisors acc day.

8/20/15

With Supervisors all morning.

Juanitta came in afternoon. Made several trials of Rigoletto attempting to improve the dramatic work. This was not wholly successful.
Tried Trio from Faust. On last trial Miss Jensen fainted because of smoke from burning trash in the Park.

8/28/15.

Wrote report.
Met with Mr. Leeming to see about directions to Dealers & Jobbers regarding horn and reproducer adjustment.
Met with Parkhurst - Reis & Halpin to agree on how this should be done.
Agreed ① to make up 2 sets of gauges, one plug gauges 3/8" × .955 to be used between reproducer cup and turntable. The other, bent gauge of metal .955 wide. In the first case the gauge will have to be used twice to determine parallelism. In the latter case, parallelism and correct height are determined in one operation.

8/24/15.

Made up recorder #60.
Miss Ingrund came in afternoon.
First tried out recorders, Miss I-
singing "Sweet Spirit Hear My Prayer".
#58 - Used as standard.
#65 - Louder, stands out better,
more sensative, not quite
as natural,
#53 - About as loud but not so
natural as #58.
#50 - Not as loud as #58 - Very
full, soft and natural both
on voice and on accompanying
piano but sounds further back
in horn.
#60 - Sharper ~~than #50~~. Stands out
better but good and true. No
tendency to bleat.
#44 - Like #50 in tone but ~~not~~
as loud.

Next tried angle horn over piano
at various distances from
12" to 30". #58 Recorder seemed
to give best results. Curiously
#44 and #50 while not loud enough

8/24/15

#60 - Test with Miss Dugrand voice and piano with angle horn. With voice, trifle thinner than #58 but stands out well and holds well. With piano-angle horn - holds well, natural. Better than 58 until 58 was tightened.

On quartette does not show up well. So thinner and sharper than 58.

8/24/15

#60 - 4 minute recorder
Brass Head - 1¼" diameter, domed top, knife edge pattern.

Diaphragm of japanese paper impregnated with shellac, two thickness with cork cone 1"x1/16" between, cemented together by heating. About .005".

Regular aluminum arm, and .008" sapphire.

#50 - Miss Dingwall singing "Sweet Spirit Hear My Prayer".

Fuel and very natural, but not loud enough, and back in horn.

With piano - angle horn above. Blasty and too fuel-

8/24/15

#50 - 4 minutt recorder.

Brass Head - Knife edge pattern - 1¼" diameter.

Diaphragm of gold beaters skin .001" thick.
Aluminum disc 1⅛" x .0025" waxed to diaphragm over which is waxed another aluminum disc 1" x .008".

Regular aluminum arm and .008" sapphire.

#44 - Miss Ingrund singing - "Sweet Spirit Hear My Prayer"

Full and natural. Not quite as loud as #50 - but back in horn & dull.

With piano, angle horn, phone, full and clearly. Goes to pieces on notes at all heavy.

With piano, regular position full and natural but not loud enough and back in horn.

9/3/15 With coat of shellac becomes louder, cleaner & stands out more.

8/24/15

#44 - 4 minute recorder.

Brass head - knife edge pattern - 1 1/4" diameter.

Diaphragm of gold beaters skin, .001". Disc of aluminum - 1/16" × .0025" waxed to diaphragm. Another aluminum dome 3/4" × .006" waxed to this.

Regular aluminum arm and .008" sapphire.

9/3/15 - Diaphragm tightened & given coat of shellac on outside.

on noise were too loud and blasted all to pieces on piano made this way. We never succeeded in getting results to compare with those made 8/18/15.

Tried #'s HL Gy 50 with piano in regular position. Got fair sounds.

8/25/15.

Wrote up provisional directions for setting reproducers for jobbers & dealers and had copies made by Mary.

Made up and tested out reproducers #'s 5H and 6H.

Met with Reis and Harpin on Disc Reproducer adjustment. Decided not to mention the adjustment for tracking in directions. Reise also called attention to having lift rod tight when adjusting and to slipping card board between automatic stop trip finger and casting when adjusting height of this lift rod.

Decided that each should write up set of directions and from these should be compiled complete directions.

#54 - Trifle thin and sharp, more so on piano than on voice.

- With Miss Ingrund - fair sharper than #58 & Rafedo,

With Quartette - too thin and sharp.

Made over
9/7/15

8/25/15

#54 - 4 minute recorder.

Brass Head, Domed Tap, Knife Edge pattern, 1¼" diam.

Diaphragm of japanese paper impregnated with shellac - two thickness of which are heated and thus cemented together with cork, 1" x 1/16" tapered - between .004".

Regular aluminum arm, and .008" sapphire.

#64 – Little sharp but louder
slugger than #54. Held
for further test.

Further test with Miss
Sungrund – sharp and weak.

8/25/15

#64 – 4 minute recorder.

Brass Head – Domed Top
Knife Edge Pattern – 1¼" diameter.

Diaphragm of Japanese Paper,
impregnated with shellac.
Two thickness of which are
heated and thus cemented together
with cork cone 1" x 1/16"
between. Diaphragm
.004"

Regular aluminum arm and
.008" sapphire

8/26/15.

Met with Kaspin, Reis and Parkhurst to formulate directions. Called away to unseen telephone for Mrs. Mark and to meeting on cylinder records with T.A.E.

On return got information collected in meeting.

Mott up provisional directions and had them typewritten.

Miss Dingwall came in afternoon. Tested out following recorders - singing "Tide as a Bird".

#58 - Standard

✗ #64 - Sharper and not loud enough

✓ #54 - Natural and fuller than 64. not as loud as 58 and does not stand out as much.

✗ #44 - Too full - Back in horn - Diction not good.

✓ #63 - Good and firm - Stands out. Loud as 58 and cleaner -

#65 Fuller than any of the others. Stands out much but sensative & inclined to blast.

(93)

#60 - Not as loud as 54 but full and natural. Little back in horn. Trifle mushy.

#50. Full and natural in tone but not clear and clear.

Quartette came in afternoon. Miss Fatio had a cold. Appregate recovering from vaccination. Tried Quartette from Rigoletto with cow hair ~~[illegible]~~ as directed.

These gave very much quieter records - I did not hear Room Sound before and did not know what it was until this was brought up. Made up a master of this also one of Il Bacio sung by Miss Pensen.

Tried recorders 63 & 54 with Quartette. Neither as good as 58.

Tried #63 and #50 with Miss Pensen. #63 sharper than 58. #50 very full and natural but back in horn and

~~[illegible] of flesh. [illegible] for master.~~

8/27/15

Met with Parkhurst, Halpin and Reis on adjustment of Disc Reproducer.

Read our specifications by sentences and discussed and corrected. Decided to rewrite as corrected.

Decided to use large base height gauge in place of plain 3/8" one.

Quartette came in afternoon Miss Fates had a cold and Appegate was recovering from vaccination so the quartette was not in condition for hard work.

Fixed up with the cow hair surgeons directed by Mr. Edison. These gave very much quieter records. I did not know what room noise was before or never realized the standard without it.

Tried Reorders 63 & 54 with Quartette. Neither as good as

58. Made master with 58 to have blue record made to show lack of room noise.

As the quartette could not do full work, had Miss Rowen sing "Il Bacio" with recorders 63, 50 & 57. #63 showed sharper than 57. #50 very full and natural - so natural that all remarked - "does not sound like a phonograph but like Miss R. singing in another room". Is too far back in horn and apparently muffled however to make commercial records.

8/28/15

Wrote up directions for setting reproducers.
Also wrote up book.
Looked into clippings by Miss D. on voice production, control and ~~agitation~~.

8/30/15

Note up report.
Made up recorder #50.
Miss Dingrund came in afternoon.
Tested out recorders #'s 58 - 50 - 9.
Singing and piano.

#50 (1) - Very full & blubbery. Natural tone to voice but chorus interference with piano even when lightly played.

#50 (2) - (Tightened up). Still full & natural. Not so much inclined to blubber. Back in horn - muffled. Not loud enough.

#50 (3) - Shellac run around free edge of gold beaters skin. Less inclined to blubber. Still full & natural but not loud enough & back in horn and muffled.

#58 - Used as standard.

#9 - Sharp - back in horn - not loud as 58. Clear, distinct well defined.

#50 as compared with #58 shows some peculiar results.
The waves on #50 under the microscope are apparently longer and deeper than with #58 yet #50 sounds louder and stands out of the horn much better.

① Very full and natural. Too sensative. Blubbers with piano interference even though played very softly. Back in horn. Rather muffled. Weak.

② As above except less blubbery and sensative

③ As above but still less sensative and inclined to blubber.

#50 - 4 minute recorder. 8/30/15

Brass Head - Knife-edge Pattern 1¼" diameter.

Diaphragm of Good Beaters Skin .001". Disc of aluminum .017" at center to .001" at edge 1⅛" diameter.

Regular aluminum arm and .008" sapphire.

① as above
② diaphragm tightened
③ free part of diaphragm showing given thin coating of shellac.

8/31/15.

Made up recorder # 69.
P Met with Parkhurst, Reis, Constable and finished directions for setting reproducers of Diamond Disc Phonographs. Had new man cut this out.
Made up recorder #57.
Tested out recorders 57-58-69.
57 and 69 are very big as compared with 58. 57 is fuller than 69. Both are fuller than 58. Both are louder more sensitive than 58. Sound fine on piano.

#69 - Voice and piano. Very loud and big. Little sharper than 57 but louder bigger & fuller & more sensitive than 58. Good on piano.

8/31/15

#69 - 4 minute recorder.

Brass Head. Domed Top.
Knife edge pattern - 1¼" diam.

Diaphragm of Goldbeaters skin .001". Given thin coating of shellac after being put in place. Disc of celluloid 1⅝" x .007" - pressed to fancy shape. Coated with shellac to fasten to diaphragm.

Regular aluminum arm and .008" sapphire.

#51 - Voice and piano.
Louder, bigger fuller &
more sensitive than 39.
Rattles on hard fuller of
chords. Fuller than 69.

8/31/15

#51 - 4 minute recorder.

Brass head. Knife edge pattern
1 1/4" diameter.

Diaphragm of Japanese
paper with thin coating
of shellac after being placed.
Disc of celluloid 1/8" x .007"
slightly domed ← 1/8" →

fastened wax in center &
released at edges.

Regular aluminum arm
and .008" sapphire.

9/1/15

Made up recorder #68 and ~~tested~~ cut. Seems to be fine. Big - full - hoots well.
Made up #67 recorder. Quality similar to #68 - Needle slightly nicked so does not give quite as good a cut.

Miss Dungrund came in the afternoon. Tested out recorders - singing - as follows:

#58 - Used as standard.
✓#67 - More natural than 58. Triple louder. Little more sensative.
#51 - Loud. Very natural of piano accompanyment. Shows interference. Blubbers a little. Too sensative.
#61 - Not as loud as 58. Sharper, thinner. Piano very thin. Back in horn.
#68 About same loudness as 58. Clearer, cleaner and more natural. Brings out individual characteristics of voice.

[117]

#68 - About same loudness as 58, clearer, cleaner and more natural. Brings out individual characteristics of the voice better.

9/10/15 Made quartetto record which was better - cleaner more distinct than #58.

9/1/15.

#68 - 4 minute Recorder - Brass Head, Knife Edge Pattern 1½" diameter.

Diaphragm of japanese paper .001" to which was fixed on inside by shellac, disc of aluminum .003" x 18" and on outside disc of celluloid .007" x 18" pressed in die to fancy pattern. After assembly coat of thin shellac was given the exposed portion of paper.

Regular aluminum arm .008" sapphire.

#67- Bigger and more natural than 58. Trifle louder. little more sensative.

9/1/15.

#67- 4 minute Recorder.
Brass head. Knife Edge Pattern
1/4" diameter.

Diaphragm of Japanese Paper dipped in shellac solution and dried - .003" thick. On inside is fastened by heating a disc of aluminum .003" x 1/8" and on outside a disc of celluloid .007" x 1/8" pressed to fancy shape in heated dies.

Regular aluminum arm with .008" sapphire.

#50. Very full and natural. Does not stand out as the others and not as clear. Fine for piano tone.

#69 - Blasts. Too loud. Too sensative. Natural quality.

Further test of #67 and #68 - 68 showed clarity, cleaner and more natural and better diction.

Neither showed good on direct piano recording

Discussed with Miss Imgrund theory of equal interval or temperment and natural intervals. Also of overtones and harmonics.

9/2/15

Made over recorder #67
Built up recorder #69.
" " " #64.
and tested out. All stand out of horn well, are full, round, loud and natural.

Mrs. Dingrund and Mr. Deutsinger came in afternoon. Tested out the following recorders, Mr. D. playing violin:

#58 Used as standard.
#68 - Louder. Stands out more. "Woody" - fuller sound.
#54 - Violin somewhat and piano very much diminished. Sharper than alone. Makes violin sound sharp and metallic.
#50 - Buried. Back in horn. Both violin and piano natural & full but muffled.

#54 - Sharp & metallic twang to violin. Buried - not free.

#51 - Very loud and big. Shows little interference. Sounds too loud or forced.

#64 - Not as loud as 58 or 51 but true, natural tone. Mellow well.

#67 - Louder than 64 and trifle sharper. Good and natural.

#69 - Full - big - natural - Not as loud but sweeter than 67 or 68.

Again change to "Allegro Brilliant" having more runs and higher notes.

#69 - Excellent on piano. Low voice notes good. High notes squeaky.

#51 - Louder than 69. Shows interference with piano.

Voice. Mood singing

#69 - Natural, but not as good diction as 58

68 - Trifle sharper but a little better diction than 69.
69 - Quite sharper than 67 but cleaner. Diction good. Stands out well.

It is evident that a good full recorder is best for violin and for piano. For the voice where the diction counts - a cleaner recorder is desired.

~~#69~~ Very good with piano.

Good, full and natural with violin.

Full and natural with voice but diction isn't as good as 68 or 58.

On quartette showed up very well. On par with #58 and 67.

9/2/15

#69 - 4 minute recorder.

Brass head. Knife edge pattern - 1/4" diameter.

Diaphragm of japanese paper to the under side of which is shellacked an aluminum disc 1/8" x .003". To the outside is shellacked a celluloid dome of .007" stock 1/8" x 1/16" raise, with small flake 1/16" at center to diaphragm. After setting in place diaphragm had thin coat of shellac.

Regular aluminum arm and .008" sapphire.

#64 - Not as loud as 67 & 68 but firm - full - and natural in quality.

The quartette - not as loud and clear and clear as 58 or 67 or 69

9/2/15.

#64 - 4 minute recorder.

Brass head. Knife edge pattern - 1¼" diameter.

Diaphragm of japanese paper to which inserted hollow dome of celuloid, .005" stock 1⅛" x ⅛" is shellacked to underside. Paper then shellacked on both sides. Ball of cotton wax to fasten center of dome to diaphragm. Dome of clear celuloid - .007" stock 1⅛" x 1/16" fastened to outside of diaphragm and the diaphragm again shellacked.

Regular arm and .008" sapphire.

9/3/15.

Experiments with recorder #44

1st with loose gold-beaters skin diaphragm. - Very full, sounds forced. Back in horn.

2nd. Diaphragm tightened. Stands out little better & is cleaner.

3rd. Shellacked diaphragm. Becomes cleaner, stands out more and is louder.

Built up recorder #55 but did not test out.

Put scales on horns to get fixed distances for singers.

Quartette came in afternoon.

First tested out recorders, appreciate singing.

#58 used as standard.

#68 Louder and bugger than 58 trifle sharper.

#67 Natural quality. Not as loud or sharp as 68.

#69 Not as loud or sharp as 68. Natural quality.

#64 - Not as loud as alone. Needs well. Even.

#9 - Back in horn. Sharp -
With Miss Pensen singing:
#9 - Sharp. Back in horn.
#58 - Louder and more natural than #9.
#69 - Not quite as loud as #58. Natural.
#67 - Natural. Louder than #69.
#68 - Sharper and stands out but
sensative.
#64 - Natural, Surface shows
#144 - Tone good. Diction not as
clean as 67-68-69 and not
as loud.

Set up for quartette. Miss
Pensen had cold and not in
full voice.
Hayes could not mark.

Distance	Appelgate	10"	Baritone Right
	Mustates	9"	Alto R. Center
	Miss Pensen	14"	S.p. L. "
	Hayes	4"	Tenor Left.

Made trials with recorders
#'s 67, 69 & 58. These three
very nearly the same. Hayes
felt bad. Did not make
record through. Made trials
at Solos and Duets.

9/2/15

55 - Better than 60 or 54 more natural but not as good as 58 - 68 or 69. Triple plunky - does not ring with piano.

9/3/15

#55 - 4 minute recorder. Diaphragm of japanese paper .001" first given thin coat of shellac. Soft aluminum dome .003" x 1⅝" x ⅛" shellacked on inner side. Coating of shellac then given outside of diaphragm and cellulod cone .007" x 1⅝" x ⅛" shellacked on outside. Another coating of shellac put on outside

Regular aluminum arm and .008" sapphire.

9/4/15.

Built up recorder #60 and tested out. Too weak. Back in horn. Tone - natural - thin.

~~Built up #55 Recorder but broke diaphragm soon as finished~~

~~Mrs Ingrund came in afternoon Tested following recorders.~~

With Piano.

#58 - Used as Standard.
#60 - About as loud. Natural. Trifle sharper. Not quite as mellow and round.

Ring test, striking middle C#

#58 - 15 seconds } hard, percussive
#60 - 12 " } stroke.
#58 - rang just as long with firm soft stroke.

"Oscar"

#58 Used as standard.
#60 Not as loud as 58 but little more natural. Articulation better.

9/4/15 - Preliminary test.
Peak, fairly natural on voice, thin on piano back in horn.

Not as loud as 58 Does not ring as much. Sounds "Woody" or little more plunky. Muffled on voice. Farther back in horn. Sounds like xylophone.

Piano "About as loud as 58. Natural, Trifle sharper. Not quite as mellow and round".

Voice "Not as loud as 58, but little more natural. Diction better".

9/4/15

#60 - 4 minute recorder.

Brass head. Domed Top. Knife edge pattern - 1¼" diam.

Diaphragm of Japanese paper. First given coat of shellac. Aluminum dome (tempered soft) of .010" material, shellacked to inside. Similar dome shellacked to outside. Exposed diaphragm both inside and out given coat of shellac.

Regular aluminum arm and .008" sapphire -

9/6/15 - Holiday - Labor Day.

9/7/15.

Photo up report.
Burnett up reader #54,
Went down to look at new studio.
Went down to see Farrel about Bell
Telephone Kinetophone Show.
Got Dawson from Mr. Edison.
at Hayes Suggestion set him
to straightening up music.
Got Scrap Book and started
Miss Sundgrund on cutting musical
data clippings.

Miss Sundgrund came in
afternoon. Tested out the
following records:
- Piano -
#58 - Used as standard
#68 - Bigger fuller - louder -
stands out better - has
not the fringe that 58
has - cleaner clearer.
#69 - Not as clear and clean
as 68 on voice. Piano
good and full and natural
but does not show the

#54 - Preliminary test. Little squeak, sharper back in horn.

Not as loud as 58 but louder than 60. Quality rather like 60 in being shrinky. Does not stand out.

9/7/10

#54 - 4 minute recorder.

Brass Head, Domed Top Knife Edge Pattern, 1¼" diam.

Diaphragm of japanese paper - .001" Given very thin coat of shellac. Aluminum disc 1⅛" x .003" (spring stock) coated with shellac & fastened to inside by heating. Similar disc fastened to outside.

Regular aluminum arm and .008" sapphire.

differentiation 68 does. not quite as loud as 68 and does not stand out as well but trifle more natural.

#60 Not as loud as 58. Does not ring as much. Sounds "woody" or little more plunky. Muffled on voice. Farther back in horn. Sounds like xylophone.

#54. Not as loud as 58 but louder than 60. Quality rather like 60 in being plunky. Does not stand out

55 - Better than 60 or 54 & more natural but not as much as 68-69 or 58. Trifle plunky.

#65 - Loud on voice. Piano shows interference on heavy chords.

#64 - Good and firm but does not ring or show the full natural tone of 58 or 69 or 68.

#50 Voice very full and heap in horn. Goes to pieces on heavy notes. Decidedly soft muffled tone.

Voice - Mr. Dawson.

#58 - Standard.

#68 - Stand out. Clear. Clear. Natural.

#69 - Not quite as loud or stands out as well as 68 but natural quality.

#54 - Piano sharp. Voice natural. Diction not as good as 68.

#55 - Not as loud. Diction not as good. Muffled. Does not stand out.

#60 - Muffled and back in horn.

#65 - Big & loud - stands out on voice but piano shows interference.

#64 - Natural voice. Piano pretty good.

#50 - Full and natural on voice but not loud enough. Goes to pieces

on low notes and shows interference.

#63- Sharp ~~pe~~ on piano. Stands out well. Voice sounds natural. Try further.

9/8/15.

Made up recorder #60 and tested out.

Made up recorder #55 but broke diaphragm on finishing.

Mrs. Imgrund came in afternoon. Tested the following recorders:

— Piano —

#58 - Used as Standard.
#68 - About as loud, natural, little sharper, not quite as mellow and round.

Ring test striking middle C#

#58 - 15 seconds } Loud, percussive
#60 - 12 " } stroke.
#58 rang as long on softer, firmer stroke.

Voice

#58 - Used as standard
#60 - Not as loud as 58 but little more natural. Diction better.
#63 - Firmer than 60 but not quite so natural. Hoebs better

9/8/15 #60 Preliminary test

Sounds little sharp and not as natural as 58.

9/9/15 - Piano - Natural - not as loud as 69 but full & natural, distinct & clear.

Voice - Voice natural full.

9/8/15.

#60 - 4 minute recorder.

Brass Head - Domed Top.
Knife Edge Pattern - 1¼" diam.

Diaphragm of japanese paper, coated with shellac.
Aluminum discs, .003" x 1⅛"
Tempered - pressed radial ridges, fastened inside and out.

Regular aluminum arm and .008" sapphire.

#58 - Natural. Hoeds. True.
#69 - Not quite as loud as 58 - Natural. Full. Has a slight metallic accompanying sound.
#68 - Good diction. Natural. Shows up well.

Big - Heavy Piano work.
#68 - Big - clear - full - natural.
#69 - Not as clear, full or natural as 68.

9/9/15.

Made up recorder #51.

Saw about making Taylor attachment for Amberola machines.

Mr. E criticized screens as not thick enough. Saw Cook who says they are regular stuff. Got piece of cow hair. This is 3/4" to 1" when fluffed out from bending but may be compressed to 1/2". As the screens were not bent much, is probably full thickness.

Made up recorder #65 ✓ sealed. This seems - very fine.

Miss Imgrund came in afternoon. Made following tests:

Piano - regular set-up -
#58 - Used as Standard.
#65 - Fuller but more muffled on voice than 58. Piano

9/9/15

#51 - Preliminary test shows sharp, weak, back in horn but Reeds well.

9/9/15 - Piano Very weak and back in horn. Not Commercial Sharp - Metallic - Tinny. N.G.

9/9/15

#51 - 4 minute recorder.

Brass Head, Domed Top. Knife Edge Pattern. 1 1/4" diameter.

Diaphragm of Japanese paper, given a thin coat of Shellac. Two discs of aluminum .003" x 1 1/8", pressed in dies giving radial grooves, are fastened on each side of this by Shellac.

Regular aluminum arm and .008" sapphire.

9/8/15

#65- Preliminary Test. Very big and full and natural both on voice and on piano.

9/9/15- Fuller but more muffled on voice than 58. Piano not as clean as 58 & little further back in horn but natural tone.

9/9/15

#65- 4 minute recorder.

Brass Head, Domed Top. Knife Edge Pattern - 1¼" diam.

Diaphragm of Japanese paper, 2 thin coats of shellac. Disc of aluminum .003" x 1⅛" shellacked to underside to which is shellacked cone of cork 1" x 1/8", turned to fit dome.

Regular aluminum arm and .008" sapphire.

not as clear as 58 and little further back in horn but natural tone. Little more muffled.

#51 - Very weak and back in horn. Not Commercial. Sharp. Metallic. Funny.

#67 - Good ring. Stands out - big - loud - full - natural.

#68 - Little sharper than #67. Not quite as loud. Shows out individual notes better. Natural, full.

#69 - Big - full - natural - about like 68. Cleaner and louder than 67.

#60 - Natural. Not as loud as 69 but full, natural, distinct and clear.

Voice

#60 - Voice full & natural. Piano "soft."

#69 - Little sharper than 60. Diction pretty good but tone not as natural as 60. Thinner.

#68 - Fuller and more natural than 69. Diction good. Not quite as full as 60.

#58 - Natural. Not as even as 67 or 68 or 69 or 60 but stands out better.

#67 - Not as loud as 58. Natural. Stands out well. Piano does not show as much tendency to interfere as with 58.

#65 - Natural - full - holds well even.

Piano with Angle Horn

Horn 18" from piano.

#65 - Too sensitive. Jumps out

#67 - Better - holds ~~little~~ better than 65 but still shows percussive effect.

Horn 22" from piano

#67 - Worse.

Horn over front of sounding board

#67 - Little better. Not good.

9/10/15.

Made reproducers with blotting paper gaskets. Most of these showed slight rattles on reproduction. Cut one set very clean & clamped tight. This did not show the rattle but reproduced fairly well.

Guarlello came in afternoon. All feeling well.

Made trials of following recorders:

#58 - Standard
#60 - Hoeb's new. Full-natural slightly muffled
#65 - Little more natural
#67 - More muffled. Does not differentiate.
#68 - Cleanest and best diction of the lot
#69 - Does not stand out as well as #68 & little more muffled.

Made records with #68 and contrasted this with

#58 and with previous records. It seems better - clearer - cleaner - more distinct and more natural.

In these used Hayes 3"
Miss Pencer 12"
Mrs Yates 8"
Applegate 9".

Noticed that good interpretation depended a great deal on the leader and that for the best results he should just follow the singer who is really taking the leading part and keep all the others in her rather than directing the time by his mechanical idea of it. In this way greater freedom and a swing is obtained while in the other the time sounds, as it is - forced.

9/11/15

Wrote up report.

Made up recorder #51.

#51 - 9/11/15

Preliminary test
Sharper than 58. About
as loud - Clear, clear,
~~testing~~ on voice. Piano
clear but triple sharp -

Voice "Triple sharper (than 68)
Starts out better. Cleaner"

Piano "Voice (announcement) triple
sharper than 58. Shows
ring. Clear, Clear.

9/11/15

#51 - 4 minute recorder.

Brass Head. Domed Top.
Knife Edge Pattern. 1½" diam.

Diaphragm of japanese paper
impregnated with shellac
.004". Disc of wood .017" x
⅛" fastened to outside.

Regular aluminum arm
and .008" sapphire.

9/13/15

Made up recorder #54 and tested out. Preliminary test sounds good. Loud, fine, stands out, cleaner than 58. Trifle sharper on voice cleaner cleaner on piano.

Mr. Jas E. Harper came about 11 am & talked until 3 P.M. He seems unable to hold himself to topic but talks about everything.

Miss Imgrund came in afternoon. Made following recorder tests:

#58 Used as standard.
✓#57 - Voice trifle sharper. Piano sharper. Shows ring & is clear.
✓#54 - Voice louder than 57. Piano louder & rings more but clear & distinct. Natural.
#69 - More muffled and back in horn. Does not ring as 51 or 54.
#67 - Rings little more than 69 - much better on piano but not as good as 57 or 54.

#54 – Preliminary test.
Loud, full, natural.
Voice shows trifle sharper and clearer and more distinct than #58. Piano shows little clearer and clearer.

Voice – "Louder (than 58) stands out well. Natural. Good."

Piano "Voice (announcement) louder than 57. Piano louder & rings more but clear & distinct. Natural."

9/13/15

#54 – 4-minute recorder.

Brass Head. Domed Cap.
Knife Edge Pattern. 1¼" diameter.

Diaphragm of japanese paper impregnated with shellac. .003" thick. Disc of wood 13/16" diameter .020" thick at center turned off to feather edge shellacked to inside.

Regular aluminum arm and .008" sapphire.

#68 Slightly sharper than 67 or 69. but plays more and is clearer.

Voice

#68 - Stands out well. Natural.
✓#51 - Trifle sharper. Stands out better. Cleaner.
#58 - Standard
✓#54 - Louder. Stands out well - Natural. Good.

Piano - Regular set up.

#54 - Plunky on higher notes.
#68 - More muffled. Not as clear as 54 more plunky
#57 - More natural than 68. Plunky. Better definition.
#58 - Trailed off the last. Does not stand out as well. Shows trifle of interference.

Then tried taking piano records under Grand Piano.
(1) Using angle horn. Too loud
(2) Using long horn #7 - horizontal. Rather natural but not loud enough

(3) Using form #7. Good but too loud in opato.

(4) Small form, instrument under piano. - Sounds like music box. Indifference.

9/14/15.

Made up recorder #50 & tested out.
Shows up about like #54 - Clear, distinct - little sharper than 54 but less muffled. Tested out with Dawson. Clear & good.

Tried out Dawson on diction. Does pronounce well yet and has slight stammer in his voice. Did better after awhile on diction.

Made up recorder #52 & tested out with Miss Imgrund on piano. Seems to be fine. Very natural & shows ring of piano.

Made up recorder 54.

Miss Imgrund came in afternoon. Played for Hayes most of the time. Tested Recorders 50-52 against 68.
#52 has excellent surface - natural on piano and stands out of the horn better than any recorder I ever heard.

#50 Preliminary test.

Quite sharper than 5 & last cleaner & more distinct.

9/14/15.

#50 - 4 minute recorder

Brass Head. Knife Edge Pattern. 1 1/4" diameter.

Diaphragm of japanese paper - given coat of shellac on each side. Wood disc 19/16" x .015" shellacked to outside and disc & diaphragm given further coat of shellac -

Regular aluminum arm and .008" sapphire.

9/15/15 #52 Piano rifle sharper than 68 or 69 but clearer and stands out. Piano most natural of all.

Voice - Bug - natural - stands out.

Test by Miss Imgrund.

Piano clearer, cleaner, voice natural - outstanding. Good to put color into a somber, heavy or colorless voice.

9/16 - Sharper than 68. Stands out better and is more brilliant but has little patter (does not hold as well). "Good diction" "natural" - "clear".

9/14/15.

#52 - 1 minute recorder

Brass Head. Knife edge pattern. 1 1/4" diameter.

Diaphragm of Japanese paper given coat of shellac on each side & heated until dry. Disc of mica 19/16 x .005 shellacked to outside. Disc & diaphragm given coat of shellac.

Regular aluminum arm and .008" sapphire.

9/15/15 Piano Sharper than 68 or 69 stocks unit. Does not ring. voice like 69 - Natural - full - clear - good surface.

9/14/15

#44 - 4 minute recorder. Brass stead, knife edge pattern - 1 1/4" diameter.

Diaphragm of japanese paper generously coat of shellac on both sides. Disc of africa .005" x 1 1/8" shellacked to outside. Disc & diaphragm given further coat of shellac.

Regular aluminum arm and .008" sapphire.

9/15/15.

Made up recorders #'s 67 & 69 and tested out.

Tested out following recorders with Mr. Dawson:

With Piano.

✓ #69 - Full, big, good diction. Stands out on voice. Little sensative Piano natural.

#68 - Full - voice phones trifle more nasal or "whiney" than 69. Piano about the same.

#44 Sharper than either of above. Holds well. Piano trifle thinner & does not ring.

#52 Trifle sharper than 68 or 69 but very clean and stands out. Piano most natural of all.

With Voice.

✓ #52 - Big - natural - stands out -

#68 - Little fuller & not quite so loud or stand out so well.

✓ #69 Like 68. Natural. Fuller than 52 but does not stand out as well. Shows tendency to

[195]

piano interference.
#44 - Like 69 - Natural. Full - clean. Good surface.

Attended meeting at Mr. Leaming's office on setting reproducer.

Miss Ingrund tested following recorders:

Voice.
#58 - Standard.
#52 - Piano clearer - cleaner, voice natural, outstanding, good to put color into a sombre, heavy or colorless voice.
#68 - Quieter, more even than 52, more musical.
#67 - Less Ring - weaker
#54 -
#59 - More sensative than 68
#69 - Less brilliant than 52.

Taylor made up diaphragms of blotting paper. 3 of the reproducers seem good.

9/15/16 - #69 Piano Full - big - good diction. Stands out on piano. Little sensation.

Voice Like 68. Natural. Fuller than 52 but does not stand out as well. Tendency to interfere on piano. "Less brilliant than 52"

9/15/15.

#69. 4 minute recorder.

Brass head. Knife edge pattern - 1¼" diameter.

Diaphragm of Japanese paper .001" given 3 coats shellac. Mica disc .005" x 1 3/16" shellacked to outside. Disc & diaphragm given further coat of shellac.

9/16/15

Tested out reproducers with blotting paper diaphragms made up by Taylor. 8 of these seem good.

Try next gaskets of cork compo marked
"Rubber Cork"
From Paddock Cork Co.,
1209 - DeKalb Ave.,
Brooklyn, N.Y.

Made up recorder #59 and tested out. Sounds weak and back in horn but fair quality and natural.

Miss Sinquand came in afternoon. Tested out recorders for singing and for piano as follows:

Piano.

#59 - Announce voice rather sharp. Piano thin. Back in horn. Holds well. Not pleasing quality. Holds well. Not loud.

(2nd)

#68 - Announcing voice not as clean. Piano bigger, fuller, more natural, louder.

Voice - Miss Dingrund.

#68 - Full - Natural - Clear - good surface.

#59 - Voice as loud & trifle more sharp but natural. Piano accompanyment not as loud. Hoeb fine.

Voice - Mr. Dawson.

#59 - Somewhat back in horn. Shows metallic twinge. Not loud enough. Piano thin.

#58 - Fuller & bigger both on voice and on piano.

#52 - Sharper than 58. Stands out better & is more brilliant but has slight metallic twinge "good diction - natural - clear".

#68 - Clearer than 58 & more distinct. Not so metallic & sharp as 52 - " natural - not as brilliant as 52. "

Voice - Mr. Dawson "Minor".

#58 - Used as standard - full - definition fair. piano natural "diction good - "natural" - good quality".

#68 - Trifle sharper than 58. Excellent diction. More fire and life in voice. Truly no loud. Good surface.

#52 - Trifle fuller than 68. Loud and standout. Just a twinge "metallic" Piano and voice clear & clean. "more outstanding - louder".

67 - Fuller than 68 or 52. Trifle further back than 52 - but natural and quiet - not so metallic - more musical. "less brilliant - less distinct - good quality"

Piano Experiment - Machine High - #7 Horn pointed downwards & Cover off.

#58 - Little - plunky - Does not ring

#52 Little but better definition & more natural.

Horn closer to piano strings.

#52 Little better - louder & more ring.

Horn still closer and in better focus -

#52 - Little better - bigger & more ring

#69 - Big - Does not hold as well as 52 - Shows blast. Back in horn.

#58 - Big - Natural - Full - trifle too much so that it is dull - Blasty.

#69 - Weaker than rest but holds - natural - full - no blasts - back in horn.

#59- Meaky - back in horn - than 68 but looks fine. Natural. Good for blast. not good for solo singing -

9/16/15.

#59- 4 minute recorder.

Brass Head, Domed Top.
Knife Edge Pattern. 1¼" diam.

Diaphragm of Japanese Paper. 2 coats shellac.
Wood disc .015" x 1 9/16" inside.
Mica Disc .002 x 1 9/16" outside
~~a~~ another .002" x 1" over.
Coat shellac over outside and inside after discs are applied.

New tapered aluminum arm and .008" sapphire.

[ITEM(S) FOUND IN BOOK]

What has become of the

~~[illegible]~~ The recital Records

(44) - Voice -
Full - very natural & good.

~~[illegible]~~
(58) - highest - angle horn
natural but above
hammer blows

(58) - angle horn 12"
- too loud blasts

(58) - angle Horn - 19"
- good and natural
~~slight lengthy~~ + heart

(59) - angle horn 21"
good and natural

[ITEM(S) FOUND IN BOOK]

(58) - same door
- loud & blasty

58 - same 15"
good and natural

65 - O once
- Full - loud -
big - blands out
but inclined to
blast

(62) - Voice -
natural - good, loud
blands out

(58) piano regular position
Good & natural

(44) - piano regular -
Very full & natural
but back in Room

(59) - piano regular
Very full & natural
more sensative than
44 - goes to pieces
on bass notes

(58) - ante Horn Piano close
- very natural -
loud good

[ITEM(S) FOUND IN BOOK]

(58) – 18" – angle horn
good and natural

(59) – 19" – angle horn
good and natural

(50) – Rattles all to pieces

(60) – firm – soft
rather natural
speed

63 – Stands out – rather natural – fine

50 – more natural – further back in horn – very full & natural. Good surface – fine

51 – Angle horn – fine
Natural tone but rattles on some notes

50 Voice – Natural & full
slightly inclined to (60)

60 – Voice – Stands out well – better than 50 but is not quite so natural – but still comparatively good.